

SMITHSONIAN MISCELLANEOUS COLLECTIONS

VOLUME 60, NUMBER 2

NEW MAMMALS FROM EASTERN  
PANAMA

BY

E. A. GOLDMAN



(PUBLICATION 2142)

CITY OF WASHINGTON  
PUBLISHED BY THE SMITHSONIAN INSTITUTION  
SEPTEMBER 20, 1912

The Lord Baltimore Press  
BALTIMORE, MD., U. S. A.

## NEW MAMMALS FROM EASTERN PANAMA<sup>1</sup>

By E. A. GOLDMAN

During the early part of the present year I was again detailed from the Biological Survey, U. S. Department of Agriculture to field work in connection with the Smithsonian Biological Survey of the Panama Canal Zone. Additional collections of mammals and birds were made in January and February in the Canal Zone. From the latter part of February to near the end of June work was carried on in eastern Panama to determine the faunal relation of the region to the Canal Zone and the better known areas to the westward and northward. The work was centered in the Pirri range of mountains which rises to a height of over 5,000 feet near the Colombian boundary southeast of San Miguel Bay. This range, one of the highest of eastern Panama, is an isolated spur jutting out into the broad, low valleys of the Rio Tuyra and its tributaries from the mountains, forming the continental divide to the southeastward. The region is covered with an unbroken forest and has a heavy annual rainfall, but at the lower levels the months from January to April are usually quite dry. At this season the prevailing winds are from the north and moisture laden air reaches the upper slopes of the Pirri Range after passing over the lower mountains along the continental divide and across the broad, dry Tuyra Valley. Clouds form almost continuously and the summits are shrouded in heavy fogs in which it is often impossible to see more than a few feet, twilight effects being produced in the forest even at midday. Although little real rain usually falls at this season the condensation of moisture on the foliage and constant dripping amount to light showers. The forest is of rather lower, denser growth than at the lower levels, many beautiful palms being conspicuous and epiphytic vegetation abundant.

The region was entered from the Pacific side. Leaving Panama by steamer, February 21, I landed at Marraganti, between one and two miles above Real de Santa Maria, near the head of tide-water on the Rio Tuyra, February 22. On the following day the river was ascended by dugout canoe as far as Boca de Cupe, a small settle-

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<sup>1</sup> This paper is the fifteenth dealing with the results of the Smithsonian Biological Survey of the Panama Canal Zone.

ment at the mouth of the Rio Cupe. From this point I proceeded overland by the tramroad of the Darien Gold Mining Company, Ltd., to the mines 30 miles southwestward at Cana. The mines are situated at 2,000 feet altitude on the southeastern slope of the mountains and afforded a convenient base for work in the general region. The time from April 12 to May 6 was spent in the vicinity of a temporary camp at about 5,000 feet altitude on the headwaters of the Rio Limon near the summit of Mount Pirri.

The collections of natural history specimens, consisting mainly of about 800 birds and 595 mammals, show that eastern Panama is South American in general faunal character. Representatives of numerous groups of both classes not previously known from Panama are found to occur, and along with them a few recognized as North or Middle American, such as the mammalian genera *Peromyscus* and *Macrogeomys*, are extended from their known ranges in extreme western Panama. A number of the birds and mammals obtained proved to be undescribed. The new birds are being published by Mr. E. W. Nelson. Fourteen new species and subspecies of mammals are described below.

In the prosecution of the work the officials charged with the administration of the Canal Zone and Panama Railroad have rendered the same courteous and active assistance as last year. Special acknowledgments for aid are due to the Darien Gold Mining Company, Ltd., which, through the kindness of its managers and directors, Messrs. M. Masse, M. Degoutin and G. Michel at Cana, and agents at various stations—Mr. Pablo Pinel at Panama, Mr. P. Campagnani at Marraganti and others facilitated the field operations in eastern Panama. To Mr. Samuel Henshaw I am indebted for the loan of topotype material, for comparison, from the Bangs Collection in the Museum of Comparative Zoölogy.

#### PERAMYS MELANOPS, sp. nov.

*Type* from Cana (altitude 2,000 feet), in the mountains of eastern Panama. No. 179609, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 23, 1912. Original number 21737.

*General characters*.—Size medium; form robust; pelage short and velvety; color very dark; ears large.

*Color*.—Upper parts in general very dark brown, suffused with cinnamon on cheeks and sides of neck, becoming blackish on face, shoulders and lower part of back; throat and sides of belly mouse

gray; under side of neck, except median stripe, grayish tinged with buffy; general color of under parts interrupted along median stripe which is buffy on neck, becoming pure white and broadening on chest, and narrowing gradually along a line extending posteriorly to near base of tail; chin with a small central white spot; ears dusky; limbs, feet and tail black all round.

*Skull*.—Rather broad across anterior roots of zygomata; sides of rostrum tapering rapidly to rather high and narrow anterior nares; nasals moderately expanded posteriorly, the expansion beginning near middle; premolars closely crowded; third upper molar deeply emarginate on outer side; posterior lower premolar smaller than middle premolar, the crown broad and extended antero-posteriorly.

*Measurements*.—Type: Total length, 168 mm.; tail vertebrae, 60; hind foot, 16.5. *Skull* (type): Condylobasal length, 28; nasals, 13.7 x 4.3; palatal length, 15; upper molariform tooth row, 9.5; upper molar series, 5.8.

*Remarks*.—The type and only specimen obtained of this very dark colored species seems to differ considerably from all of the previously known members of the genus. It may be similar to *adustus*, but the latter is described as lighter in color and apparently differs in other characters.

#### MARMOSA INVICTA, sp. nov.

*Type* from Cana (altitude 2,000 feet), in the mountains of eastern Panama. No. 178708, male adult, U. S. National Museum (Biological Survey Collection), collected March 14, 1912. Original number 21517.

*General characters*.—Size rather small; form slender; color very dark; skull smoothly rounded, without supraorbital or temporal ridges, and scarcely a trace of postorbital processes.

*Color*.—General color of upper parts in fresh pelage blackish slate with a faint silvery sheen, darkening to pure glossy black on lower part of back and rump (becoming dull, very dark brown in worn pelage); middle of face mouse gray; under parts, including inner sides of limbs lightly washed with silvery white, the under color of the fur slaty black; scrotum clothed with short silky hairs which are silvery white to roots, in marked contrast with the dark body color; mammae in adult female enclosed in a cinnamon brownish area; chin, lips and lower part of cheeks whitish; antorbital spots black; wrists, ankles and feet to toes dusky, the toes white; tail dark brownish above, somewhat lighter below.

*Skull*.—Smoothly rounded, flattened above, very broad across anterior roots of zygomata; supraorbital and temporal ridges absent; postorbital processes faintly indicated in male only; frontal region broad, slightly constricted near point where postorbital processes usually develop; audital processes of alisphenoids and enclosed bullæ small; incisive foramina reaching to posterior plane of canines.

*Measurements*.—Type: Total length, 248 mm.; tail vertebrae, 137; hind foot, 19. An adult topotype: 240; 136; 17.5. *Skull* (average of two adults): Greatest length, 31.1 (31-31.2); condylobasal length, 30.5 (30.2-30.8); zygomatic breadth, 16.1 (16-16.3); nasals, 14.1 x 3.4 (14.1 x 3.3-14.1 x 3.5); frontal constriction, 6.1 (6-6.2); palatal length, 16.7 (16.5-17); upper molariform tooth row, 11 (10.8-11.3); upper premolar series, 4.7 + (4.7-4.8).

*Remarks*.—This pigmy opossum is very different from the other Middle American species and I am unable to associate it with any of those described from South America. It is characterized externally by darker color than usual in the genus. The frontal constriction is further back than in *elegans* which has similarly rounded supraorbital borders. The type and topotype are at the molting stage. In the type a patch of worn pelage remains on the anterior part of the back, while in the topotype collected about a week later the molt has progressed only as far as the head.

*Specimens examined*.—Two, from the type locality.

#### MICROSCIURUS ISTHMIUS VIVATUS, subsp. nov.

*Type* from near Cana (altitude 3,500 feet), in the Pirri range of mountains, eastern Panama. No. 179565, female adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, June 5, 1912. Original number 21771.

*General characters*.—Similar to *isthmus*, but upper parts paler; under parts more orange buffy, less ferruginous.

*Color*.—Upper parts, including outer sides of limbs, rather coarsely grizzled black and pale orange buff or buffy yellow, the yellowish element palest and clearest on head, and especially on cheeks; under parts orange buffy, clearest and strongest on under side of neck, chest and inner sides of fore legs, becoming a lighter wash on belly and inner sides of hind legs where the darker under color of the fur shows through; throat and ears buffy yellow, like cheeks; feet tawny ochraceous; upper side of tail coarsely grizzled black and pale buff, under side tawny ochraceous, with a black submarginal stripe and grayish buffy edging, becoming pure black at tip.

*Skull*.—Closely resembling that of *isthmius*, but rostrum slenderer and premaxillæ narrower posteriorly than in the type; interpterygoid fossa broad, and interparietal convex anteriorly as in *isthmius*.

*Measurements*.—Type: Total length, 260 mm.; tail vertebrae, 113; hind foot, 38. Average of two adult topotypes: 239 (236-243); 110 (110-110); 36 (35-37). *Skull* (type): Greatest length, 38.2; condylobasal length, 33.5; zygomatic breadth, 22.5; nasals, 10.7; interorbital breadth, 13.4; palatal length, 17.5; maxillary tooth row, 6.5.

*Remarks*.—This pigmy squirrel is allied to the darker, richer colored *M. isthmius*, which is based on specimens from the Truandó River, Colombia, and it requires no close comparison with *venustus* which occurs at 1,500 feet lower elevation on the same mountain slope. It is readily distinguished from *venustus* by much paler, more coarsely grizzled color of upper parts. Comparing the skull with that of *venustus*, the interpterygoid fossa and basioccipital are broader, the maxillæ encroach further on the frontals between the lachrymals and premaxillæ, and the interparietal is subtriangular instead of rectangular. The occurrence of these widely differing pigmy squirrels in close proximity on the slope of the Pirri range of mountains seems to show that the forms typified by *alfari* and *isthmius* belong to two very distinct groups.

*Specimens examined*.—Three, from the type locality.

#### PEROMYSCUS PIRRENSIS, sp. nov.

*Type* from near head of Rio Limon (altitude 4,500 feet), Mount Pirri, eastern Panama. No. 178997, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 3, 1912. Original number 21675.

*General characters*.—A large species of the subgenus *Megadontomys*; similar to *flavidus*, but hind foot longer; color decidedly darker, less ochraceous; skull larger, with longer, slenderer rostrum; anterior lobe of first upper molar very narrow and entire, or slightly notched.

*Color*.—General color of upper parts varying from dark brownish cinnamon to cinnamon rufous lined with black, becoming grayish brown on head and more rusty on rump; sides brighter, more rufescent; under parts dull buffy white, the plumbeous basal color of fur showing through everywhere; nose and upper sides of forearms to near base of toes dusky; toes of fore feet whitish; hind feet whitish more or less clouded with dusky over proximal half of metatarsus;

tail brownish and nearly unicolor, clothed with very short inconspicuous hairs leaving the annulations showing distinctly. *Young* (about one-third grown): Decidedly darker than in *flavidus* of corresponding age.

*Skull*.—Larger than that of *flavidus*, with rostrum less swollen laterally; nasals more attenuate posteriorly; anterior lobe of first upper molar decidedly narrower, the longitudinal notch shown in *flavidus* faint or absent.

*Measurements*.—Type: Total length, 348 mm.; tail vertebrae, 185; hind foot, 35.5. Average of six adult topotypes: 356 (342-376); 197 (185-204); 36 (35-36.5). *Skull* (average of six adults): Greatest length, 42.3 (40.8-44.2); condylobasal length, 38.1 (37-40); zygomatic breadth, 20.6 (20.2-21.5); nasals, 17.5 (16.5-19.2); interorbital breadth, 6.1 (5.8-6.5); interparietal, 11 x 5.2 (9.8 x 4.8-12.1 x 6); incisive foramina, 7.9 (7.3-8.2); length of palatal bridge, 7.1 (7-7.8); maxillary tooth row, 6.1 (5.9-6.3).

*Remarks*.—This species is evidently more closely allied to *flavidus* than to any other known form, but differs notably in dentition. The anterior lobe of the first upper molar is narrower, less extended internally, and the longitudinal notch is faint or absent. The supplementary cusps are rather weakly developed for a *Megadontomys*, and the general form of the tooth suggests the 5-tuberculate condition of typical *Peromyscus*. In *flavidus*, on the contrary, the division of the anterior lobe being more complete the dentition is not very unlike that of the 6-tuberculate genus *Rhipidomys*.

*Specimens examined*.—Twenty, all from 3,500 to 5,200 feet altitude in the vicinity of Mount Pirri.

#### NEACOMYS PICTUS, sp. nov.

*Type* from Cana (altitude 1,800 feet), in the mountains of eastern Panama. No. 178717, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, March 13, 1912. Original number 21512.

*General characters*.—Similar in color to *N. pusillus* from the coast region of western Colombia, but decidedly larger; feet white instead of yellowish; pelage of upper parts composed of grooved black-tipped spines and slender orange rufous hairs.

*Color*.—Upper parts orange rufous mixed with black, resulting in a grizzled effect, the black predominant on head, middle of face, and lower part of back; sides, shoulders and cheeks paler, more ochraceous buff, this color clearest along a sharp line of demarca-



tion between upper and under parts; under parts, including lips and under sides of forearms, white, the fur pure white to roots on throat, becoming somewhat duller and faintly plumbeous basally on belly; forearms brownish above near wrists, and ochraceous buffy along outer sides; inner sides of hind legs pale buffy; nose and orbital rings dusky; feet white; tail dark brown above, lighter below to near tip which is dark all round. *Young* (half-grown): Similar to adults, but darker, less rufescent.

*Skull*.—Larger than that of *pusillus*; brain-case bulging posteriorly well behind plane of occipital condyles; temporal ridges extending posteriorly along lateral margins of parietals to supraoccipital; nasals reaching posteriorly beyond premaxillæ.

*Measurements*.—Type: Total length, 159 mm.; tail vertebrae, 83; hind foot, 21.5. Average of three adult topotypes: 160 (158-163); 84 (83-87); 20.8 (20.5-21). *Skull* (average of four adults, including type): Greatest length, 21.4 (21.3-21.5); condylobasal length, 18.6 (18.2-19); zygomatic breadth, 11.2 (11.2-11.3); nasals, 8.6 (8.3-9); interorbital breadth, 4.4 (4.3-4.7); interparietal, 8.3 x 2.2 (8.2 x 2.3-8.5 x 2.2); incisive foramina, 3 (3-3.2); length of palatal bridge, 3.8 (3.7 x 4); maxillary tooth row, 2.7 (2.7-2.8).

*Remarks*.—This handsome little spiny mouse seems to require comparison only with *pusillus*. The adults present remarkably slight variation in size or color. A half-grown young individual is in a comparatively soft pelage corresponding to the immature coat seen in *Heteromys* and other genera.

*Specimens examined*.—Five, four adults and one young, all from 1,800-2,000 feet altitude at the type locality.

#### RHEOMYS RAPTOR, sp. nov.

*Type* from near head of Rio Limon (altitude 4,500 feet), Mount Pirri, eastern Panama. No. 179028, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, April 28, 1912. Original number 21658.

*General characters*.—Size small; color dark; fur short and glossy, the longer hairs of back about 9 mm. in length; probably most like *trichotis*, but still smaller, with darker upper parts, and without white markings on under parts or tip of tail.

*Color*.—Upper parts from nose to base of tail mixed black and cinnamon, producing a finely grizzled effect, the black predominating especially on head and rump; sides paler and somewhat grayer; entire under parts varying from pale smoky gray to pale mouse gray,

passing without a sharp line of demarcation into darker color of sides, the fur everywhere darker and more plumbeous basally; ears well clothed with dark hairs, whiskers grayish; sides of rump with a few projecting white hairs as in *Ichthyomys hydrobates*; upper surface of metacarpus blackish; metatarsus, including fringing bristles, brownish; toes of fore and hind feet dull white; tail well haired, black all round. *Young* (nearly full-grown): Upper parts nearly uniform mouse gray, lacking the cinnamon element of the adult pelage.

*Skull*.—Small and smoothly rounded, the frontal region not depressed as in *Ichthyomys hydrobates*; audital bullæ short and rounded; incisors of the ordinary murine type; molars about as in *Ichthyomys hydrobates*.

*Measurements*.—Type: Total length, 201 mm.; tail vertebrae, 94; hind foot 23.5; ear from meatus (in dry skin), 7.7. An old adult topotype: 214; 102; 26.5. *Skull* (type): Greatest length, 25.7; condylobasal length, 24.8; zygomatic breadth, 13.8; nasals, 10.5; interorbital breadth, 5; interparietal, 7.3 × 2.7; incisive foramina, 4.9; length of palatal bridge, 5.5; maxillary tooth row, 4.2.

*Remarks*.—*Rheomys raptor* appears to be the smallest known member of the *Ichthyomys* group. It may be not very unlike *trichotis* which is still imperfectly known, but differs considerably from the color description of the latter species. The upper incisors are clearly of the *Rheomys* type, the anterior surface not heavily beveled internally as in *Ichthyomys*, in which the beveled internal border results in the deep emargination of the cutting edge. The whiskers are reduced to slender hairs, quite different from the stiff bristles of *Ichthyomys*.

*Specimens examined*.—Three, all from 4,500 to about 5,000 feet altitude on the upper slopes of the mountains in the vicinity of Mount Pirri.

#### MACROGEOMYS DARIENSIS, sp. nov.

*Type* from Cana (altitude 2,000 feet), in the mountains of eastern Panama. No. 179587, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 31, 1912. Original number 21760.

*General characters*.—Similar in general size to *cavator*, but tail longer, color a duller brown or black, lacking the rich seal brown shade of *cavator*; pelage shorter; whiskers and vibrissæ over orbits

and in front of ears brown instead of silvery gray; skull more elongated, much narrower posteriorly and differing widely in detail.

*Color*.—Upper parts dull chocolate brown, becoming nearly pure black in fresh pelage; under parts and inner sides of limbs nearly naked, the scattered hairs a lighter brown, becoming grayish on lips and near base of tail; whiskers brown; feet and tail brownish, or dark flesh color.

*Skull*.—Size large, rather elongated, with anteriorly spreading zygomata, narrow brain-case and narrow rostrum; similar to that of *cavator*, but less massive, more elongated, narrower posteriorly, with lower lambdoid crest and narrower rostrum; premaxillæ less extended posteriorly, leaving a wider space for the union of frontals and maxillæ between premaxillæ and lachrymals; upper surface of premaxillæ more constricted near zygomata, the sides of rostrum bulging below; lambdoid crest low, nearly straight or slightly convex posteriorly (not high and sinuous as in *cavator* and *pansa*); squamosals less expanded laterally as postglenoid shelves, the margin deeply notched and exposing much of tubular portion of bulla when viewed from above; parietals and squamosals less upturned posteriorly; mastoid process of squamosal and lateral wing of supraoccipital less expanded vertically; maxillary and squamosal arms of zygoma more widely separated by jugal (meeting or nearly meeting along upper border of zygoma in *cavator*), third upper molar shorter, the posterior heel less produced; incisors narrower.

*Measurements*.—Type: Total length, 401 mm.; tail vertebrae, 132; hind foot, 53.5. Average of three adult male topotypes: 367 (358-376); 129 (122-135); 51.5 (51-53). Average of four adult female topotypes: 364 (348-388); 121 (118-128); 49.9 (48-52.5). *Skull* (type): Condylbasal length, 70.7; zygomatic breadth, 44.7; nasals, 27.8 x 8.9; breadth of premaxillary constriction in front of zygoma, 13; interorbital breadth, 10.9; breadth across postorbital processes, 16.2; breadth across mastoid processes of squamosals, 39.3; breadth between postglenoid constrictions of squamosals, 28.1; basion to summit of lambdoid crest, 18.2; alveolar length of maxillary tooth row, 14.2.

*Remarks*.—The pocket gopher of eastern Panama seems to be most like *cavator* of western Panama, but differs in numerous characters from all its congeners. In the general elongation of the skull and low, nearly straight lambdoid crest it is somewhat like *dolichocephalus*, but the zygomata are divergent anteriorly, and the skull is unlike all the Costa Rican species in the postglenoid con-

traction of the squamosal platform, and the greater anterior development of the basioccipital below the plane of the audital bullæ.

*Specimens examined*.—Total number, 15, from localities in eastern Panama as follows: Cana (type locality), 11; Boca de Cupe, 4.

**HETEROMYS CRASSIROSTRIS, sp. nov.**

*Type* from near head of Rio Limon (altitude 5,000 feet), Mount Pirri, eastern Panama. No. 179016, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, April 26, 1912. Original number 21649.

*General characters*.—A small species of the *desmarestianus* group allied to *panamensis*, but decidedly smaller, color paler; skull with much broader, more massive rostrum.

*Color*.—Ground color of upper parts dark mouse gray, shaded with black on median dorsal area and in a line down rump to base of tail; slender hairs ochraceous buffy, somewhat altering the general color and producing a grizzled effect; under parts, including inner sides of limbs, lips and borders of pouches, white; outer sides of forearms and hind legs dark mouse gray; fore feet usually white, but sometimes clouded with dusky to near toes, the toes white; hind feet dull white, changing to dusky on proximal third of metatarsus; ankles dusky all round; tail brownish above, whitish below, in some specimens becoming white all round on a subterminal band or at tip. *Young* (in first pelage): Upper parts varying from nearly uniform blackish slate to slate black; under parts pure white.

*Skull*.—Similar in general to that of *panamensis*, but smaller with rostrum much broader and heavier; brain-case rather smoothly rounded, the temporal and supraorbital ridges only moderately developed.

*Measurements*.—Type: Total length, 267 mm.; tail vertebræ, 132; hind foot, 32.5. Average of eight adult topotypes: 266 (255-277); 140 (132-149); 32.9 (31.5-34). *Skull* (average of five adults): Greatest length, 34.5 (33.7-35.5); zygomatic breadth, 16.3 (15.8-17); interorbital breadth, 9.3 (9-9.5); nasals, 14 (13.8-14.3); width of brain-case in front of projection of auditory meatus, 14.6 (14.5-14.8); interparietal, 9.4 x 5 (8.2 x 4.8-10 x 5.3); maxillary tooth row, 5.2 (5-5.5).

*Remarks*.—*H. crassirostris* is one of the smallest of the known species of the genus. It requires close comparison only with *panamensis*, from which it is quite distinct. The supraorbital shelves are rather weakly developed for a member of the *desmarestianus* group

and suggest the condition usual in South American species of the genus. In the adult pelage a few inconspicuous pure white hairs are irregularly intermingled with the bristles on the back.

*Specimens examined*.—Twenty-three, all from 4,500 to about 5,000 feet altitude on the upper slopes of the mountains in the vicinity of the type locality.

#### HYDROCHÆRUS ISTHMIUS, sp. nov.

*Type* from Marraganti, near the head of tide-water on the Rio Tuyra, eastern Panama. No. 179703, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, April 4, 1912. Original number 21591.

*General characters*.—Similar to *Hydrochærus hydrocharis* in color, but size decidedly smaller; skull differing in important details, especially the peculiar, short, thickened condition of pterygoids.

*Color*.—Upper and under parts in general varying from very dark rusty reddish to dull pale clay color, usually somewhat darker above than below, becoming more or less blackish in some specimens on middle of face, cheeks, lower part of rump, and outer sides of hind legs; orbital rings, sides of muzzle and spots near base of ears paler, more buffy; ears and feet brownish, thinly haired. *Young* (about one-fourth grown): Upper parts more tawny ochraceous than in adults.

*Skull*.—Smaller than that of *hydrocharis*; nasals with inner border more extended forward over anterior nares, approaching median projection of premaxillæ; maxillary portion of outer wall of antorbital vacuity broader; maxillo-premaxillary suture passing further forward along upper surface of rostrum, and turning thence more abruptly downward; incisive foramina relatively narrower; premaxillæ with posteriorly extended portions reaching to near posterior plane of incisive foramina (ending well in front of this plane in *hydrocharis*); pterygoid processes shorter, thicker, more rounded, less produced posteriorly; dentition about as in *hydrocharis*, but relatively lighter.

*Measurements*.—Type: Total length, 1,025 mm., hind foot, 200. Average of two adult females: 998 (972-1,025); 197 (195-200). *Skull* (type): Greatest length, 200; zygomatic breadth, 116.5; interorbital breadth, 52.5; length of nasals along inner side, 79.8; width of nasals posteriorly, 47.7; palatal length, 122; length of palatal bridge, 70.8; alveolar length of maxillary tooth row, 64.2.

*Remarks*.—The capybara is among the more interesting mammals whose known ranges are found to extend into Panama. The

Isthmian representative of the genus seems to be a distinct species as shown by comparison with specimens of *hydrocharis* from Surinam, Brazil and Paraguay. In Panama it is apparently restricted to a limited area near the head of tide-water in the delta region of the Tuyra and Chucunaque rivers.

*Specimens examined*.—Six, all from the type locality.

**ISOTHRIX DARLINGI**,<sup>1</sup> sp. nov.

*Type* from Marraganti (near Real de Santa Maria), on the Rio Tuyra, eastern Panama. No. 179577, female young, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 11, 1912. Original number 21739.

*General characters*.—Size rather small; color pale; head grayish brown; ears tufted; hind feet short and broad, armed with short, sharp, strongly curved claws; tail unicolor, evenly tapering, thinly clothed with short hairs, becoming a trifle longer but not thicker or forming a distinct brush near tip. Somewhat similar to *labilis*, but smaller and much paler in color; differing also in cranial characters.

*Color*.—Upper parts ochraceous buff, somewhat darkened by admixture of black-tipped hairs along back, becoming grayish brown on middle of face and cheeks; nose, lips and muzzle mouse gray, this color abruptly interrupted at posterior base of whiskers by a white vertical streak; orbital rings black; a small white supraorbital spot; ears brownish or blackish, with a marginal fringe of longer hairs, and tufts of the same length and color near anterior and posterior base; inner base of ears clothed with a partially concealed patch of whitish fur; whiskers and a postorbital tuft of long vibrissæ black; under parts ochraceous buff, becoming grayish on wrists, ankles and chin; feet silvery white; tail brownish.

*Skull*.—Similar to that of *labilis*, but smaller and relatively broader; zygomata more spreading anteriorly; audital bullæ larger, more inflated; dentition about as in *labilis*. In general form and dentition much as in *Isothrix caniceps* as figured by Günther, but palate narrower and premaxillæ reaching posteriorly beyond nasals.

*Measurements*.—Type: Total length, 472 mm.; tail vertebræ, 240; hind foot, 44. *Skull* (type): Greatest length, 53.5; condylobasal length, 49.5; zygomatic breadth, 25.2; nasals, 14.4; interorbital breadth, 12.3; palatal length, 23.1; length of palatal bridge, 12.8; maxillary tooth row, 12.9.

<sup>1</sup> Named for Dr. S. T. Darling, of the Sanitary Department, Isthmian Canal Commission, who first collected the species, at Ancon, Canal Zone.



*Remarks.*—Close comparison of this form with the insular species, *labilis*, is unnecessary, the latter being distinguishable at once by intense rusty reddish coloration. It may be similar to *Isothrix caniceps* (Günther), from Medellín, Colombia, but the latter seems to be somewhat different in color, with a bushy tail, and the skull as figured differs in detail. Unfortunately no fully adult examples of the new form are available. In the skull of the type the posterior molars are not yet fully in place.

*Specimens examined.*—Two, from localities as follows:

Panama: Marraganti (type locality), 1.

Canal Zone: Ancon, 1.

**SYLVILAGUS GABBI MESSORIUS, subsp. nov.**

*Type* from Cana (altitude 1,800 feet), in the mountains of eastern Panama. No. 179569, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 23, 1912. Original number 21736.

*General characters.*—Closely allied to *gabbi*; general color less rufescent, more grayish or paler buffy, and more heavily overlaid with black.

*Color.*—Top of head rusty reddish mixed with black; nape ochraceous buff; dorsal area varying from buff to pale ochraceous buff of Ridgway, heavily overlaid with black; sides paler, more creamy buff, the hairs less broadly tipped with black; nose blackish; cheeks buffy, more or less washed with black; ears brownish, becoming blackish along outer side of anterior border; under side of neck dull buff, this color encroaching on under parts along sides of belly; rest of under parts, including inner sides of limbs, white, the under color of fur more or less plumbeous across belly; outer sides of forearms and feet ochraceous buffy; tail ochraceous buffy, with a partially concealed dark spot near tip. *Young* (in first pelage): Less rufescent than *gabbi* or *truci* of similar age.

*Skull.*—Closely resembling that of *gabbi*; audital bullæ slightly larger, with a correspondingly deeper constriction of basioccipital between them. Compared with that of *truci* the skull is less massive, with smaller audital bullæ and decidedly longer palatal bridge.

*Measurements.*—Type: Total length, 370 mm.; tail vertebrae, 17; hind foot, 80. Average of two adult topotypes: 363 (343-384); 17 (16-18); 76 (75-78). *Skull* (type): Greatest length, 73; condylobasal length, 65.5; zygomatic breadth, 36.7; nasals, 29.2 x 12.5; interorbital breadth, 15; palatal length, 31.2; length of palatal bridge, 7.6; maxillary tooth row, 14.7.

*Remarks.*—The forest rabbits of the *gabbi* group doubtless inhabit nearly the whole of Panama, and range from sea level well up on the slopes of the higher mountains. Eight specimens from localities on both the Atlantic and Pacific sides in the Canal Zone agree with the types of *gabbi* and have been used for comparison. The new form lacks the strongly rufescent suffusion shown in *gabbi*, and the upper parts are more obscured by the long black tips of the longer hairs.

*Specimens examined.*—Ten, from the type locality.

**ICTICYON PANAMENSIS, sp. nov.**

*Type* from near head of Rio Limon (altitude 5,000 feet), Mount Pirri, eastern Panama. No. 179046, female adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, April 28, 1912. Original number 21655.

*General characters.*—Similar in general to *venaticus*, but color of head and shoulders paler, less rusty reddish; skull differing in detail.

*Color.*—*Type*: Top and sides of head, neck, shoulders, and anterior half of back pinkish buff, varying to buffy white between shoulders and middle of neck; flanks and posterior half of back similar, but somewhat darkened by a sparse admixture of dusky hairs; under side of neck, chest, and belly pale ochraceous buff thinly mixed with black, becoming clearer ochraceous buff on inguinal region; interorbital space, muzzle and anterior cheeks pale ochraceous buffy, varied by a few black hairs under eye; chin dusky; fore limbs blackish except toes and a narrow line along under side which are pale buffy; hind limbs blackish, becoming buffy on inner sides of thighs, and brownish toward toes; buttocks covered with mixed dusky and buffy hairs; tail black with a few brownish hairs along basal half of under side. *Young* (nearly full-grown, but very immature): Top of head, ears, and neck pale ochraceous buff, this color darkening by intermixture with black hairs on a V-shaped area narrowing from between shoulders to a point near center of back; posterior half of back, sides, shoulders, entire under parts and tail black; limbs and feet brownish black; interorbital space, cheeks, and eyebrows mixed black and pale buff; muzzle and upper lip dusky.

*Skull.*—In general form closely resembling that of *venaticus*, but rostrum apparently more depressed; nasals tapering more gradually and reaching further posteriorly (lateral margins turned more abruptly inward in *venaticus*); frontals and premaxillæ not meeting



along lateral border of nasals (meeting in Winge's photograph of *venaticus*); third upper premolar shorter and more obliquely placed; fourth upper premolar narrower in proportion to its length; molars  $\frac{2}{3}$ .

*Measurements.*—Type: Total length, 740 mm.; tail vertebrae, 125; hind foot, 118. Average of two nearly full-grown young females: 689 (680-698); 130 (130-130); 114 (113-115). *Skull* (type): Occipitonasal length, 122; condylobasal length, 120.2; zygomatic breadth, 78; nasals,  $36.2 \times 14$ ; interorbital breadth, 30.8; palatal length, 65; upper molariform tooth row, 43; alveolar length of second upper premolar, 6.2; length of third upper premolar, 6.8; length of fourth upper premolar, 11.8; breadth of fourth upper premolar, 5.8; length of first upper molar, 9; breadth of first upper molar, 6.3.

*Remarks.*—The discovery of a bush dog in Panama materially extends the known range of the genus. I am unable to make direct comparison of the Panaman species with museum material of the Brazilian *I. venaticus*, but it differs in apparently important respects and in view of its isolation will doubtless be found to possess additional characters when specimens of the two forms are brought together. The lighter areas of the body are of a paler, less rusty red color than represented in the descriptions and illustrations of Lund,<sup>1</sup> Burmeister,<sup>2</sup> Flower<sup>3</sup> and Mivart.<sup>4</sup> The skull figured by Lund seems to be of a young individual and the figures untrustworthy. Those figured by Burmeister, Huxley<sup>5</sup> and Mivart are better, but each differs considerably in detail and they may not all represent typical *venaticus*. Better still, for comparative purposes, is a photograph by Winge<sup>6</sup> of the upper surface of a skull apparently representing the typical animal from Lagoa Santa, Brazil. It is worthy of note that in the Panaman form the second upper molars are present in all of the three skulls examined. One skull of an old female shows that these teeth are at least not always early deciduous as Flower suggested may be the case in *venaticus*.

*Specimens examined.*—Three, an old female and her off-spring, two nearly full-grown young, from the type locality.

<sup>1</sup> Kongel. Danske Videnskab. Selskabs. natur. og. math. Afhandlinger, 11 Deel, Kjöbenhavn, 1845, "Blik paa Brasiliens Dyreverden, for sidste Jordomvæltning, 5<sup>te</sup> Afhandling," p. 62, pls. 41 and 43.

<sup>2</sup> Erläuterungen zur Fauna Brasiliens, 1856, pp. 1-18, pls. 17-20.

<sup>3</sup> Proc. Zool. Soc., 1880, pp. 70-76, pl. 10.

<sup>4</sup> Monograph of Canidae, 1890, pp. 189-194, pl. 43, text figs. 52-54.

<sup>5</sup> Proc. Zool. Soc., 1880, pp. 268-269.

<sup>6</sup> E. Museo Lundii, "Jordfundne og mlevende Rovdyr (Carnivora) fra Lagoa Santa, Minas Geraes, Brasilien," pp. 29-31, pl. 5.

**BASSARISCYON GABBI ORINOMUS, subsp. nov.**

*Type* from Cana (altitude 1,800 feet), in the mountains of eastern Panama. No. 179157, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, March 10, 1912. Original number 21474.

*General characters.*—Similar to *gabbi* in size, but color more tawny or paler fulvous, less brownish; skull with very long postorbital processes, broad basioccipital and small audital bullæ; differing from the other species mainly in cranial details.

*Color.*—Upper parts in general pale fulvous darkened along median line of dorsum by black-tipped hairs, becoming grizzled grayish on top of head and face; under parts varying from pale orange buff to very pale buffy yellow; upper base of ears distinctly blackish in some specimens, fulvous in others; feet varying from grayish fulvous to grayish brown; tail varying shades of pale fulvous, darker above than below, becoming brownish or blackish toward tip and more or less distinctly annulated along median portion.

*Skull.*—In general outline about as in *gabbi* (frontal profile convex, not flattened as in *alleni*); basioccipital broader; postorbital processes longer, more projecting; audital bullæ decidedly smaller; dentition as in *gabbi*. Similar to that of *richardsoni* in development of postorbital processes, but basioccipital broader and audital bullæ smaller.

*Measurements.*—Type: Total length, 820 mm.; tail vertebrae, 419; hind foot, 86. An adult female topotype: 840; 450; 84. An old adult male from Mount Pirri: 865; 457; 88. *Skull* (type): Greatest length, 85; condylobasal length, 85; zygomatic breadth, 56.2; interorbital breadth, 18; breadth across postorbital processes, 35.8; palatal length, 46.5; upper molariform tooth row, 23.7.

*Remarks.*—The known forms of *Bassariscyon* seem to agree closely in essential characters and may prove to be geographic races all assignable to a single widely ranging species. As in many other groups cranial modifications are more reliable than color as distinguishing characteristics. No material showing the color of *gabbi* at the type locality is available, but a specimen from near Gatun, Canal Zone, agrees very closely in cranial details with the type and coming, as it does, from within the same general faunal area may be regarded as typical. In this specimen the face is gray as usual in the genus, and not at all like Huet's<sup>1</sup> figure of the animal from "Caimito, dans la province de Correo, un peu au nord de Panama"

<sup>1</sup> Nouv. Arch. du Mus. d'Hist. Nat. de Paris, 2<sup>o</sup> ser., V, 1883, pp. 1-12, pls. I-III.

(= the vicinity of Chorrera, about 17 miles southwest of Panama) and only about 30 miles from Gatun. Huet's figures of the skull, on the other hand, agree very well with the type of *gabbi* and on geographic grounds might be expected to represent that species. The skulls from Gatun and Chorrera agree with the type of *gabbi*, and differ from the new form here described in the shorter postorbital processes, larger audital bullæ and correspondingly narrower basioccipital. *B. richardsoni* has long postorbital processes, but the audital bullæ are large and the basioccipital narrow as in *gabbi*. The new form may be not very unlike *medius*, but the latter is described as having a smaller, lighter muzzle and rather smaller molars than *gabbi* (therefore differing from *orinomus*). In addition the long postorbital processes, broad basioccipital and small bullæ of *orinomus* could scarcely have been overlooked and left unmentioned by Thomas if present in his specimens of *medius*. Another apparent peculiarity of the new form is a perforation, or transverse median notch, in the fold of the basioccipital close to the foramen magnum. This perforation is present in all the skulls examined, ranging in age from that of a young individual in which the deciduous teeth are being replaced by the permanent series to those of adults with worn molars. In *Bassariscyon* the principal bones of the skull become fused early in life; with advancing age the temporal ridges become prominent in the male, but apparently do not unite to form a sagittal crest.

*Specimens examined*.—Total number, 4, from the following localities in Panama: Cana (type locality), 3; Mount Pirri, 1.

#### CRYPTOTIS MERUS, sp. nov.

*Type* from near head of Rio Limon (altitude 4,500 feet), Mount Pirri, eastern Panama. No. 178976, male adult, U. S. National Museum (Biological Survey Collection), collected by E. A. Goldman, May 2, 1912. Original number 21669.

*General characters*.—Member of the *mexicana* group similar to *C. orophila*, but somewhat smaller; claws decidedly smaller; color darker; skull high and narrow.

*Color*.—Entire upper and under parts uniform glossy black; feet dusky; tail black all round.

*Skull*.—Slightly smaller than that of *orophila*, with much narrower brain-case; interorbital region more depressed; large upper pre-molar with antero-internal cusp less prominent; first and second upper molars relatively broader and shorter; third upper molar smaller, the internal lobe weakly developed and unpigmented.

*Measurements.*—Type: Total length, 98 mm.; tail vertebræ, 31; hind foot, 12.5. Average of two adult topotypes: 96 (91-101); 26.5 (25-28); 12.2 (12-12.5). *Skull* (type): Condylbasal length, 18.8; zygomatic breadth, 6.5; lachrymal breadth, 5; breadth of brain-case, 9.3; depth of brain-case, 5.1; upper tooth row, 8.8.

*Remarks.*—By the discovery of this small species so close to the Colombian frontier, the known range of the *mexicana* group is materially extended eastward from Costa Rica. It seems to require close comparison only with *orophila*. The skull differs conspicuously from that of typical *mexicana* in narrower brain-case, and in the weaker development of the inner cusps of most of the upper teeth; the postero-internal lobes of the first and second upper molars are lower and unpigmented much as in *tropicalis*. The claws of both fore and hind feet are unusually small for a shrew of the *mexicana* group.

*Specimens examined.*—Three, all from 4,500 to 5,000 feet altitude along the headwaters of the Rio Limon in the vicinity of Mount Pirri.